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AUTHOR Bailey, John E., III
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ABSTRACT

This paper demonstrates a process for investigating the economic and budgeting impact of educational innovations on the educational systems where they are introduced, based on the assumption that the money to finance educational innovations will have to be shifted from existing programs or other innovations. To illustrate the use of his analytical procedure, the author examines two separate models of educational innovations. Model A represents an attempt to introduce one major organizational change into a school, while Model B illustrates an attempt to implement a number of changes simultaneously. (JG)

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ASSESSING THE ECONOMIC IMPACT OF EDUCATIONAL INNOVATION

John E. Bailey III

NOVA UNIVERSITY
Fort Lauderdale, Florida
7 February 1975

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PREFACE

While the figures used in this paper are based on information provided by the Broward County Schools, they represent only approximations of the situation at the time of this writing. In addition to a number of minor changes, there has been a major revision in the school budgets due to an unexpected change in funds received from the state of Florida. Thus none of the information in here should be taken to represent the exact situation, but it is a fairly accurate approximation.

PURPOSE- The purpose of this paper is to explore a process by which educational research and development can be made more responsive to the needs of educational practitioners. Specifically it looks at the economic impact of educational innovations on schools without the happy but unrealistic assumption that there will be extra money to pay for the innovations. Thus it looks at both the changes and the cuts in other areas that must be made to accomodate them. In this particular instance two alternative models are explored. The first model embodies the implementation of a form of differentiated staffing; in effect one change. The second model is a package of changes. Implementing a package of changes introduces the added problem of trading off between innovations as well as existing practices. The final step in the process is an examination of ways to analyze and compare the resulting budgetary packages.

PROCESS- The process explored here consists of two steps. The first step is to build from an existing school the budget for the changed school incorporating the new practice or practices. The existing school can either be a specific existing school or an approximation of a typical school for which the new practice is designed. In this case an actual school complex has been chosen. The process of building the budget incorporating the changed practices should use the actual

costs faced by that school or realistic approximations of those costs. Finally the planner must stay within the budgetary constraints of the schools for which he is planning.

The second step is to analyze the resultant changes. The analytical process will, of course, vary depending on the purpose of the study. Clearly an important part of the analysis is simply to determine whether practice has followed rhetoric. Where have the funds been committed? Many educational changes are primarily rhetoric. They amount to changing the name of old programs. The result is that the same people do mostly the same things to the same kids with the same materials. The analysis can measure the change that is envisioned. Beyond that the analytical procedures can be used to look at the specific problems and prospects of a change in a given situation. Since this paper only explores the process is does not face this more difficult analytical task. Rather it simply analyzes the changes that are proposed.

THE SCHOOL- The schools used in this study as the basis for the changes are the Nova Complex schools. The history of the Nova Complex began with the founding of a high school on a site west of Fort Lauderdale, Florida in 1963. When it opened the school covered grades 7 to 10, expanding to grade 12 by 1965. In that same year an elementary school (grades 1-6) was

opened. The next year a second elementary school was opened in an old high school in downtown Fort Lauderdale. 1970 brought a number of changes to the Nova Complex. In that year a new building was completed on the complex site into which moved the second elementary school; kindergarten programs were instituted; and a middle school was set up by transferring the sixth grade students to the high school. In 1972 the middle school was separated from the high school and some of the space in the high school was given over to specific middle school use. The current organization consists of the two elementary schools which cover from K-5, a middle school covering 6-8 and the high school covering 9-12.

The physical facilities and their layout are covered in Figure 1. All the schools in the complex are constructed on at least a semi-open plan. Most of the buildings are constructed to be useable as conventional self-contained classrooms or as larger classrooms suitable for team teaching. The high school and middle schools have their own built-in TV facilities including a control room and production facilities. The elementary schools are not connected to this system, but can use programs broadcast by the Broward County Instructional Television facilities. One of the elementary schools is built on an entirely open plan basis. Its layout is contained in Figure 2.

Altogether these schools have 4600 pupils. The elementary schools have approximately 800 each. The middle school has approximately 1000. The high school has approximately 2000. These pupils are drawn from all over Broward County. Pupils are selected on a first come- first served basis from those who have applied to go to the school. There is typically a long waiting list.

The total budget for the entire complex amounts to $4,208,772. The high school receives $1,953,304, the middle school $902,635 and the elementary schools $1,352,833. This represents approximately $900 per pupil. This covers just the amount spent on operating these schools. It does not include the costs of the central office or construction costs, such as interest.

PROGRAM FACT SHEETS

THE NOVA SCHOOLS

Rationale- The Nova schools were leaders in designing and implementing a number of innovative practices which have since spread elsewhere. Detailed accounts exist of their practices which will be summarized here. The innovative practice which Nova pioneered was the Learning Activity Package (LAP). The LAP is designed to allow the learner to work individually at his own pace and to select a variety of different learning activities. In addition to the LAP the Nova schools are largely open, non-graded and taught by teaching teams. Among the innovations that are being tried in parts of the schools are Initial Teaching Alphabet and the Individually Prescribed Instruction methods. The Nova schools are the site of an initial step toward year round school within Broward County.

Staffing- The staffing of the non-instructional phases of the Nova Complex are fairly conventional with principals, assistants, librarians, guidance counselors, etc. Instructionally some use is made of non-certified personnel in the form of aides and occupational specialists. In the elementary schools there is approximately one aide per every three teachers. In the middle and high schools this ratio is about one to four. This staffing is detailed in Table 1.

MODEL A- FUNCTIONAL STAFFING

Rationale- Model A incorporates only one change although it is a fairly major one. The change is a form of differentiated staffing. However, instead of differentiating along "ability" or skill dimensions, this model uses function as a basis. What it does is to break down the global role of the teacher into a number of specialized functional roles. Currently the teacher instructs, assesses pupils, develops and selects materials, evaluates the program, as well as performing various non-instructional tasks. What little research and development activity as occurs at the school level is also the responsibility of the teacher.

Functional staffing is based on the belief that no one person can possibly fill all of these roles adequately. Any one of them is a challenge to do and do well. Thus they are broken apart, and each task is assigned specifically to a person or teams of persons. In this model there are instructional, research/evaluation, materials development, assessment, and non-instructional components. Clearly each of these components must work together and ideally there should be cross-fertilization and role exchanges on a personal basis. Practically, however, the bulk of the tasks under each rubric will be accomplished by the people working in that area. When hiring people they will be choosen for their abilities in that area

as the primary consideration. Thus instead of a group of teachers hired (and ultimately) trained in a wide range of skills, the faculty of a school will consist of people having strengths in a number of specialized areas.

Staffing- This model does not change the staffing in the non-instructional areas of the school. Only in the instructional area is staffing changed. However that change is dramatic. There are now people specifically assigned to the functions of research/evaluation, curriculum design, materials design, and assessment. The instructional task is broken up into instruction and instructional management, staffed by certified personnel and various non-instructional tasks staffed by non-certified personnel. The details are contained in Table 2.

MODEL B- MULTIPLE INNOVATIONS

Rationale- This model attempts to incorporate a number of changes that have been proposed individually into one integrated model. As such it incorporates changes in almost every area of the school and its practices. In terms of the organization of the complex it introduces three major changes. One change is a dynamic one and as such is not adequately represented in a single budget. That change is zero budgeting, that is the practice of not allocating specific amounts to overhead activities, but rather allocating all monies to the operational activities who then "buy" services from the overhead activities in line with their needs. In this budget specific amounts are shown for the various overhead activities, based on estimates of the requirements of the operational units. Over time these figures could be more, less or the same as the perceived needs of the operational units change. Other organizational changes are the introduction of a management team and management analysis components. The management team consists of people with the primary responsibility of the "people", "thought","action" and "front" responsibilities of the Nova Complex. Figure 3 illustrates this organizational idea. In addition a management analysis section is included. It serves as a consulting and planning section both for the top management and for other units in the complex.

In terms of instruction, there are two major changes. The first is the introduction of functional staffing as outlined under the discussion of Model A. The second change is the introduction Personalized Instruction through the use of peer and cross-age tutoring, LAPs, and the Personalized System of Instruction (PSI). This system of instruction places primary reliance on materials and pre-prepared instructional materials instead of traditional lecture style teaching. The "teachers" role changes from a lecturer to an instructional manager whose responsibilities include preparation of materials and instructional sequences as well as overall supervision of the learning process. Aides and other students are utilized to carry out the bulk of the non-instructional tasks as well as tutoring on a one-to-one or small group basis. The materials based mode is the primary one, but other more traditional methods can be used as well, particularly in terms of personal interaction skills.

In terms of pupil services there is a substantial overall increase. The library receives considerably more emphasis and changes its role slightly. It becomes more of a resource center, picking up the role of surveying available materials and responding to the instructional components needs for information on the subject. Additionally the library would expand its role as a resource center for independent study. The guidance function is redefined and renamed placement. Its function is redefined based on the idea that the

school has the responsibility to place the student in the post-school situation that he desires given that he accomplishes the goals the school sees as pre-requisites to that situation. This implies that the school needs to make an early effort to help the student intelligently select the direction in which he and his parents wish him to go, and then the school should monitor his progress so as to identify the fact that progress is not sufficient. It is then the joint responsibility of the school and the student to take corrective action. The placement office's function is to work with the student in identifying his direction and then to monitor his progress. It works with the student and the instructional elements when problems arise. It also has the related function of working with people in the community and the colleges to secure students work-study opportunities while they are in school and placements once they are out of school. The final element in the pupil services areas is the assessment center. Its function is to work with the instructional component to establish testing standards and then to actually conduct the testing. In this regard it serves the function of certifying student progress. It also does the psychological and other diagnostic testing for the school or contracts for testing that is not within its capability.

The final category of changes is in the area of administration. The most important change is the

introduction of a comptroller/finance office at the complex level. Besides handling the functions that are currently handled at the school level, this office serves the function of providing expertise in designing the system to account for the intra-school financial transactions arising from the zero-budgeting system. Naturally it would be expected that this office would do a considerable amount of the work in maintaining those systems as well. The administrative services component serves the function of maintaining switchboard, reproduction and clerical services for people within the complex. The idea is that these functions would be utilized on an as needed basis rather than each component hiring a person or persons to do that work, regardless of the day-to-day variations in need.

Taken together these changes constitute a substantial alternative to even the innovative schools that make up the Nova Complex. While unlikely to be workable or desireable in every detail, it points to the fact that implementing a number of the innovations that are advocated on a piecemeal basis can add up to a radical change. To the extent that it represents an integration of those innovations, it may illustrate why adoption of just one of the innovations in the context of an existing school is unlikely to radically alter its style or performance.

Staffing- The staffing plan clearly embodies the comprehensive nature of the changes envisioned by this model. A number of new functions have been added and the personnel have been consolidated into single offices rather than being located in each individual school. There has been the addition of a top management group for the complex as a whole as well as a community board of directors with their own separate staff. Figure 3 illustrates the overall organizational relationships involved. Table 3 contains the specific people involved in each area.

The instructional components have changed in a way similar to that envisioned in Model A. If anything this model moves the certified personnel more into the role of instructional management and materials development. In this model students are expected to share with non-certified people many of the lower level instructional tasks as well as handling administrative and non-instructional tasks.

ANALYSIS

ANALYTICAL PROCEDURES

General- The analysis of these budgetary models are based around two key concepts. The first concept is that of cost centers. Cost centers are those major activities that taken together constitute the total costs of the school. Cost points are the second concept. They are activities within the cost centers that are the major contributors to the cost within each center. Cost points are specific activities and taken together they do not add up to the overall costs. Thus the cost centers point to the distribution of cost among the acitivities within the school while cost points point out the individual activities that absorb most of the costs while ignoring the many miscellaneous activities that are only minor contributors to the overall cost picture.

Cautions- There are two problems which obscure some of the comparisons and make this analysis less effective than it might be. The first caution is implied by the comments on functional staffing. The money allocated to instruction in the existing model actually covers the salaries of teachers. While the teacher's primary function is instruction, teachers also perform a number of other functions which are accounted for separately in the other two models. Thus some of the differences are an artifact of the system of budgeting.

The second problem is the lack of accounting for many of the costs that lie outside of the school. To be most effective this analytical procedure should be utilized in the context of the total cost to the community of the educational system. A number of key costs such as building expense, capital, transportation are not included. Without this data the programs cannot be compared in the context of the community's needs.

Cost Center Analysis- In comparing the existing school complex to the two alternative models, the first step should be to dispose of the items that are identical across all three budgets. Those items are the vocational, special education, community school, and maintenance areas. The resources devoted to them are covered in Table 4.

The regular instruction component shows a marked reduction in both of the alternative models. It received 60.2% of the total expenditures in the existing school budget while receiving 42.6% in the Model A budget and 48.7% in the Model B budget. This item also experiences a considerable amount of variability within school levels. In the existing school elementary budget it amounts to 70.4% of the budget compared to 52% in the high school budget. Both of the alternative model budget reduce this variability considerably. The causes for these differences will be explored in more detail under the cost point analysis.

In administration the existing school's arrangements are retained in Model A. As can be noted in Table 5, there is a considerable amount of variability between the school levels in their allocations for administration. The Model B budget allocation for administration is fairly similar in its total, but differs considerably in the distribution. Specifically 5.1% of its total has been shifted into the complex wide functions of

top management, administrative services, and comptroller. The administrative services and comptroller functions would be zero budgeted, so the figures contained here are estimates of the services they would render to the operational units.

Pupil services are more than doubled in the two alternative models as Table 6 indicates. In Model A this difference is entirely composed of the addition of assessment to the pupil services since the allocations to library and guidance are identical to the existing school. In Model B both the library and guidance functions are augmented and the additonal function of staff development is included. The allocation to assessment is somewhat reduced compared to the Model A budget. Again it is important to remember that the teachers currently fulfill all assessment functions in the existing schools. Depending on how much of their time is devoted to that effort, the existing school allocation to this function might be more or less than either of the two alternative models.

There is no existing allocation to the research and development functions in the budget, and that is reflected in Table 7. This is again partly an artifact since a number of people in the existing school complex actually devote some time to these functions. To the extent that they do devote time in this area some budgetary allocation should be made. This comparision is accurate to the extent that it reflects the fact that

there are no people devoted full time to these functions within the existing schools. As between Models A and B, there is considerable variation. Model A devotes roughly twice the amount to this function that Model B does. This is partly an artifact of the organizational structures in that the materials development function which is separately listed in Model A is included under the library in Model B. But it also reflects the fact that there are certain costs associated with maintaining separate offices in each of the school levels. Finally it represents a higher overall commitment in Model A.

The final difference is the existence of a community board of directors in Model B. Neither the existing schools or Model A have such an entity. In Model B it represents .9% of the total budget. Combined with the community school this amounts to 1.4 % of the budget in Model B devoted to community relations.

Cost Point Analysis - Regular Instruction- As Table 8 reflects, across all models there is one cost that overwhelms the rest, certified teachers salaries. This is especially true in the existing schools where it consumes over half of the educational dollar alone. In the other models this cost amounts to approximately 30%, but is still the single largest cost. Both alternative models stress the use of aides and actually devote nearly twice as many resources to them. Model B which stresses the use of materials does have more resources devoted to them, over 6% as opposed to negligible amounts in the other models. Even this amount may be too low when compared to the theoretical emphasis this model gives to the use of materials.

It is important to renew the caution mentioned at the start of this section. Without good information on how teachers are actually spending their time, this budgetary analysis is not as powerful as it should be. It is geared to look at activities not people per se. In the existing system this information is not at all well known as far as the budget goes. Models A and B, especially the latter are somewhat improved in that regard, but the comparisons are inexact at best. It is probably not permissible to say that Models A and B place more emphasis on non-instructional tasks simply because they allocate more money to aides unless one knows how much time the teachers in the existing system actually spend in those type of tasks. About the only safe conclusion is that Model B allocates more to materials.

SUMMARY

The primary function of this paper was to illustrate a process. That process is the investigation of the economic and budgetary impact of educational changes on the real world educational systems for which they are intended. It is intended to provoke an integration of theories, ideas, research, development, and the real world of the schools. Numerous studies of the change process in education (Miles,1964) have demonstrated conclusively that change can not and will not occur unless it is geared to the needs and agendas of the people who make it possible. Those people are in the schools. For the serious investigator who is interested in educational change, it is critical to integrate ideas into the systems that must implement them. Model A in this paper represents an attempt to integrate one major change into an existing school. Model B illustrates an attempt to deal with implementing a number of changes simultaneously. In addition to the economic or financial integration attempted here, there are also the problems of politics (the community), organization (the people), and instruction (the students). A complete impact survey would need to deal with all of these componentes. While a serious attempt to deal with this problem represents considerable effort and expense, it is likely to save even greater amounts that would have otherwise been poured into projects that produce

unused developments. Beyond those savings it is likely to spark a host of new ideas that will have impact. In sum the costs may be substanial, but the rewards are likely to be far greater.

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TABLE 1

EXISTING SCHOOL STAFFING

ELEMENTARY *

	PRINC	ASST	TEACH	AIDE	CLERK
INSTRUCTION			77	22	
ADMINISTRATION	2				5
LIBRARY			2		
GUIDANCE			2		
ASSESSMENT					
DEVELOPMENT					
RESEARCH/EVAL					
CURRICULUM DEV					
MATERIALS DEV					
MANAGEMENT ANAL					

MIDDLE SCHOOL *

INSTRUCTION			49	10	
ADMINISTRATION	1	1			5
LIBRARY			1	1	
GUIDANCE			1	1	
ASSESSMENT					
DEVELOPMENT					
RESEARCH/EVAL					
CURRICULUM DEV					
MATERIALS DEV					
MANAGEMENT ANAL					

HIGH SCHOOL *

INSTRUCTION			91	16	
ADMINISTRATION	1	4	5		15
LIBRARY			2	1	
GUIDANCE			4		3
ASSESSMENT					
DEVELOPMENT					
RESEARCH/EVAL					
CURRICULUM DEV					
MATERIALS DEV					
MANAGEMENT ANAL					

* Figures are estimates.

TABLE 2

MODEL A - STAFFING

ELEMENTARY

	PRINC	ASST	TEACH	AIDE	CLERK
INSTRUCTION			51	40	
ADMINISTRATION	2				5
LIBRARY			2		
GUIDANCE			2		
ASSESSMENT			4	2	2
DEVELOPMENT					
RESEARCH/EVAL			2		2
CURRICULUM DEV			2		2
MATERIALS DEV			2	2	
MANAGEMENT ANAL					

MIDDLE SCHOOL

INSTRUCTION			32	26	
ADMINISTRATION	1	1			5
LIBRARY			1	1	
GUIDANCE			1	1	
ASSESSMENT			2	2	1
DEVELOPMENT					
RESEARCH/EVAL			1		1
CURRICULUM DEV			1	2	
MATERIALS DEV			1		1
MANAGEMENT ANAL					

HIGH SCHOOL

INSTRUCTION			62	44	
ADMINISTRATION	1	4	5		15
LIBRARY			2	1	
GUIDANCE			4		3
ASSESSMENT		1	2	4	1
DEVELOPMENT					
RESEARCH/EVAL		1	1	1	1
CURRICULUM DEV		1		1	1
MATERIALS DEV			3		2
MANAGEMENT ANAL					

TABLE 3

STAFFING SUMMARY SHEET

EXISTING*

	PRINC	ASST	TEACH	AIDE	CLERK
INSTRUCTION			217	48	
ADMINISTRATION	4	5			25
LIBRARY			5	2	
GUIDANCE			7	1	3
ASSESSMENT					
DEVELOPMENT					
RESEARCH/EVAL					
CURRICULUM DEV					
MATERIALS DEV					
MANAGEMENT ANAL					

MODEL A

INSTRUCTION			145	110	
ADMINISTRATION	4	5			25
LIBRARY			5	2	
GUIDANCE			7	1	3
ASSESSMENT		1	8	8	4
DEVELOPMENT					
RESEARCH/EVAL		1	4	1	4
CURRICULUM DEV		1	3	3	3
MATERIALS DEV			6	2	3
MANAGEMENT ANAL					

MODEL B

INSTRUCTION			137	96	
ADMINISTRATION	5	1	10		8
LIBRARY		1	4		3
GUIDANCE		1	5		4
ASSESSMENT	1	1	5	2	2
DEVELOPMENT			3		1
RESEARCH/EVAL	1	2	1		1
CURRICULUM DEV		1		1	1
MATERIALS DEV					
MANAGEMENT ANAL		1			1

* Figures are estimates.

TABLE 4

COMMON ITEMS

Function	Total	Lower	Middle	High
Vocational Education	8.1	0	8.7	13.1
Special Education	6.9	13.4	8.7	1.5
Community School	.9	0	0	2.0
Maintenance	6.4*	5.3	5.8	7.5

*Figure for Model B is actually 6.2

All Figures are percentages of respective budget totals.

TABLE 5

ADMINISTRATION

Function	Total	Lower	Middle	High
Existing & Model A	11.8	6.0	10.0	16.6
Model B-Total	11.2			
Top Management	2.0			
Administrative Services	.8			
Comptroller	2.3			
School Directors	6.1			

TABLE 6

PUPIL SERVICES

Function	Total	Lower	Middle	High
Existing School-Total	5.6	5.0	5.4	6.3
Library	2.4	2.8	3.0	1.9
Guidance	3.1	2.1	2.3	4.2
Model A-Total	12.7	12.9	12.9	12.5
Library	2.4	2.8	3.0	1.9
Guidance	3.1	2.1	2.3	4.2
Assessment	7.0	8.0	7.5	6.2
Model B-Total	13.2			
Library	3.6			
Guidance	3.6			
Staff Development	1.2			
Assessment	5.0			

TABLE 7

RESEARCH & DEVELOPMENT

Function	Existing	Model A	Model B
Research/ Evaluation	-	3.2	2.7
Curriculum Design	-	3.9	.8
Materials Design	-	3.4	*
Management Analysis	-	-	1.0

All figures are percentages of overal budget total.

* included under library.

TABLE 8

INSTRUCTIONAL COST POINTS

Function	Existing	Model A	Model B
Personnel			
Certified	54.1	31.0	31.7
Aides	5.1	11.6	10.2
Materials	*	*	3.9
Capital	*	*	2.3

All figures are percentages of overall budget total.

* negligible

FIGURE 1

NOVA COMPLEX

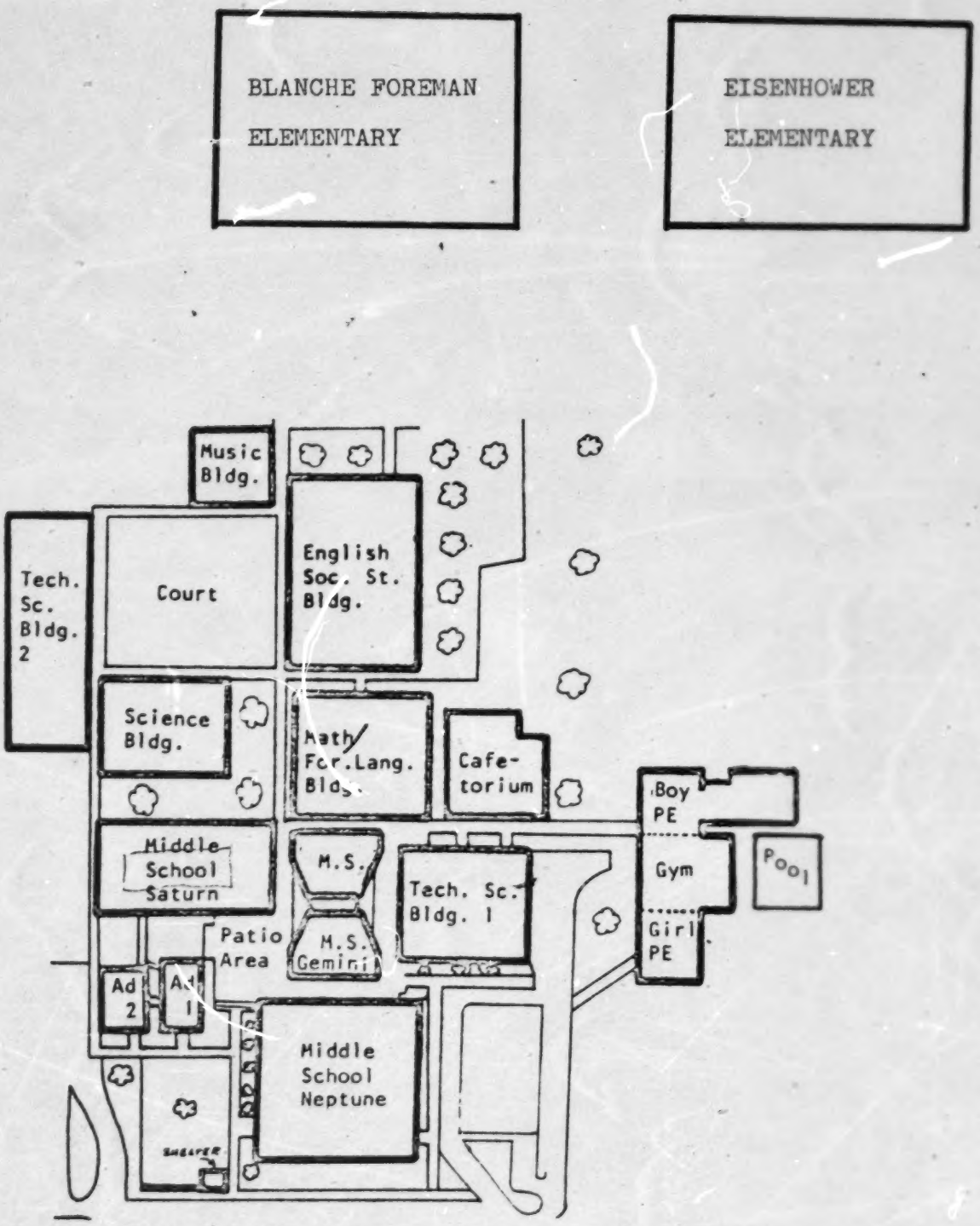


FIGURE 2

OPEN PLAN - EISENHOWER ELEMENTARY

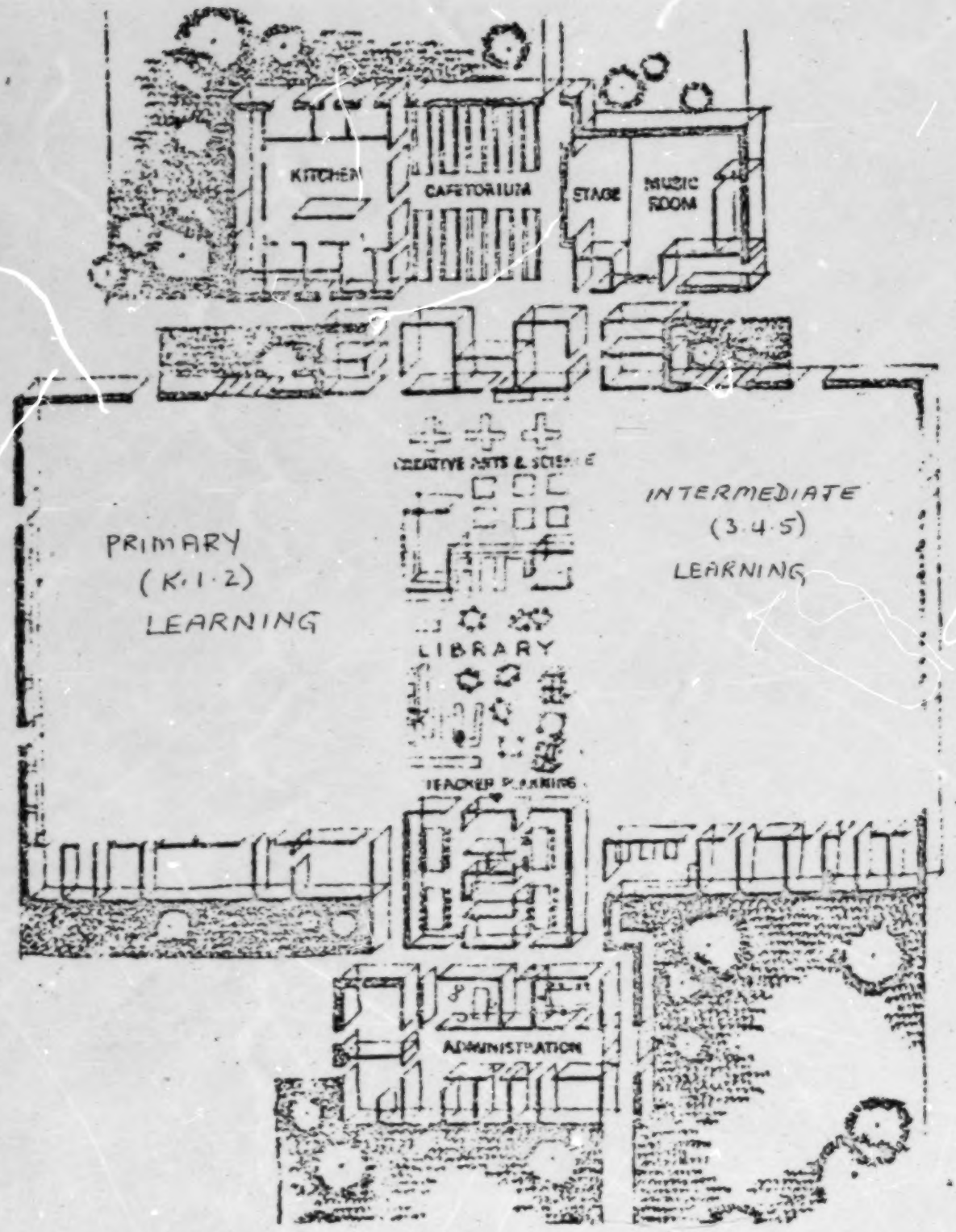
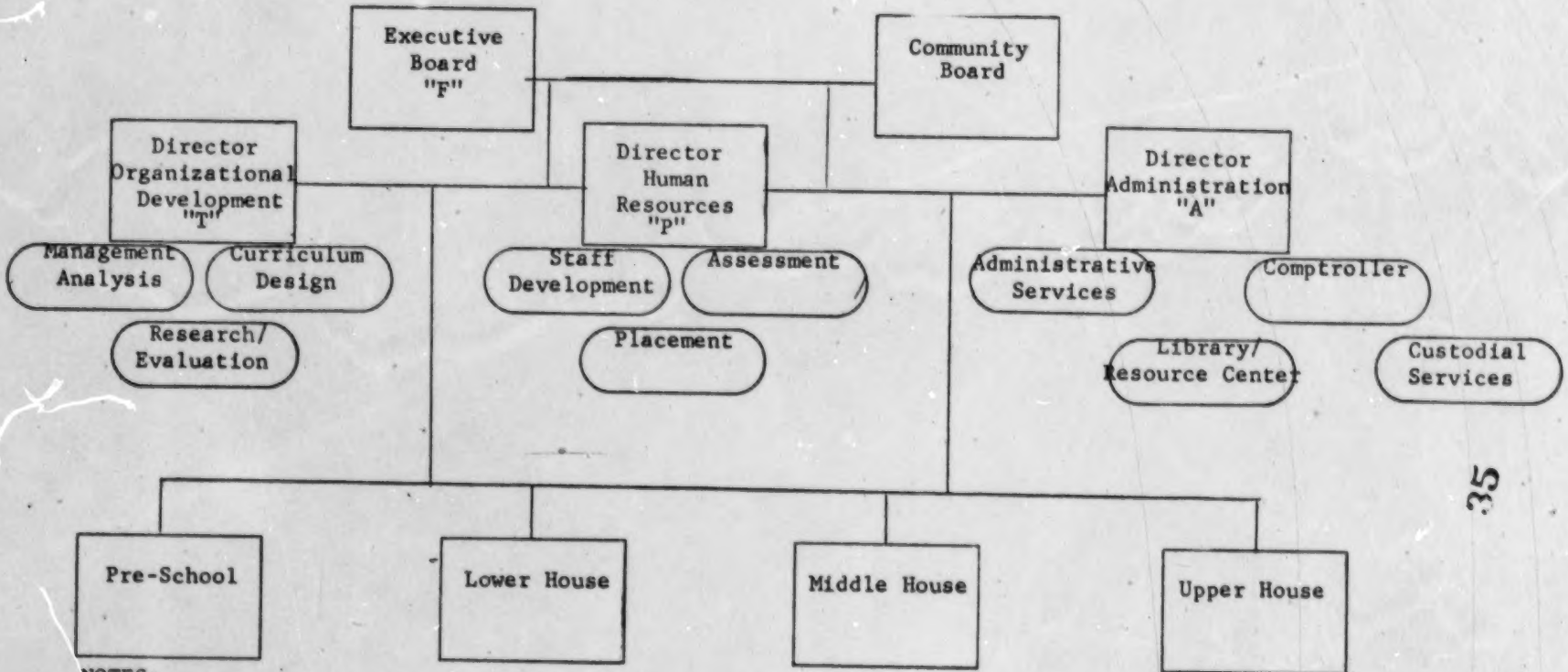


FIGURE 3

MODEL B.- ORGANIZATION



NOTES:
"F"- Front or Community Relations
"T"- Thought or Development
"P"- People or Organization
"A"- Action or Production

( ) - indicates offices that are zero budgeted